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THE BIOLOGY OF *IPHIGENIA TRUNCATA* (MONTEROSATO) (BIVALVIA, TELLINACEA)

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ABSTRACT

The ecology, feeding habits and ciliary currents of *Iphigenia truncata* are described. The species occurs in large numbers in the brackish parts of the Lagos lagoon system, with sandy bottom. It is absent from areas with muddy deposits and from the eastern part of the lagoon where freshwater conditions obtain all year round.

Iphigenia truncata feeds mostly on suspended particles; the ciliary currents of the mantle cavity are however typical of the family. The stomach differs from those of the bottom-feeding Tellinacea in having a well developed dorsal pouch where sorting of particles takes place and in having a very small postero-dorsal caecum containing no sand grains.

Iphigenia truncata incubates the eggs in its mantle cavity.

INTRODUCTION

Iphigenia truncata (Monterosato) occurs in large numbers in the central part of the Lagos lagoon system between the Carter bridge on the west and Palaver Island on the eastern side (Fig. 1). The species is important not only because it forms the main food of many dermasal fishes, e.g., *Chrysichthys nigrodigitatus* and *Gerres melonopterus* (Fagade, 1969), but because the occurrence of the genus in West Africa and also on both coasts of South and Central America, lends support to the theory that the southern continents were once joined together by land (Purchon, 1968). *Iphigenia truncata* is also very important in being a member of the typically marine family Donacidae, which is a comparatively recent addition to the fresh water fauna (Purchon, 1968).

Although the biology of many European species of the order Tellinacea has been studied (Graham, 1934, 1937; Yonge, 1949), the West African representatives of these bottom feeders have received little attention. Apart from Nicklés (1950), who gave a brief description of the shell of *Iphigenia truncata* and of 6 other species in the genus which also occur in West Africa, nothing has been written on the biology of the West African *Iphigenia.* The present work is an attempt to investigate the biology of *I. truncata,* one of the 2 dominant bivalves occurring in the Lagos lagoon.

MATERIALS AND METHOD

The anatomy of *Iphigenia truncata* was studied by dissections, as well as in serial sections of specimens fixed in Bouin's fluid, embedded in paraffin wax, and stained with Ehrlich's haematoxylin and eosin. The ciliary currents of the mantle cavity were investigated by introducing various sizes of carmine particles and iron filings into the mantle cavity after the right valve and the right mantle lobe had been carefully removed. Some specimens were kept in aquaria to study the burrowing behaviour.

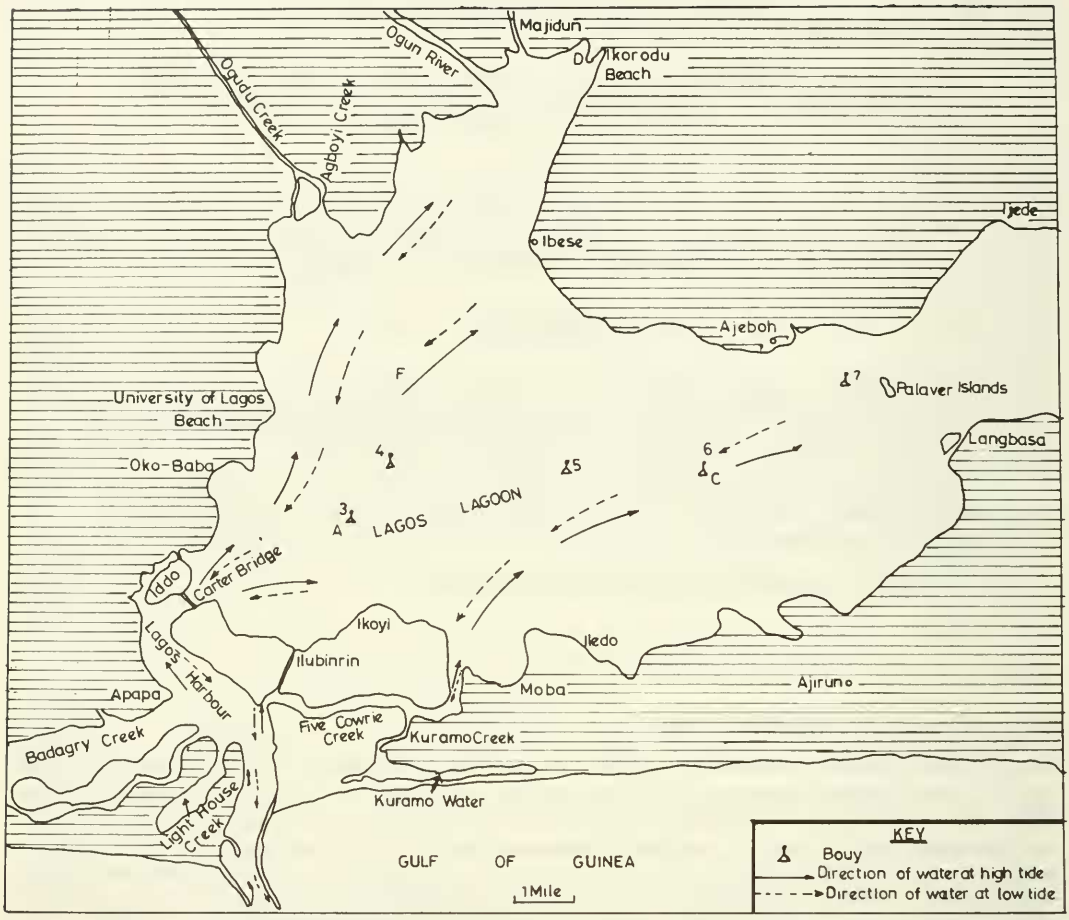

FIG. 1. Map of the central part of Lagos Lagoon system where *Iphigenia truncata* occurs.

ECOLOGY

Iphigenia truncata seems to favour quiet waters with low salinity. Fig. 2 shows the salinity of Ikorodu beach where the species occurs abundantly. The species is absent from the harbour with fast bottom currents and bottom salinities above 10‰ all year round. It is also absent from the eastern part of the Lagos lagoon system where freshwater conditions obtain throughout the year. *Iphigenia truncata* occurs only in areas where the bottom deposits consist of clean sand or sandy mud. The other common animals which occur in the same habitat are *Pachymelania aurita, Neritina glabrata* and *Aloidis trigona. Branchiostoma nigeriense* occurs in the same type of deposit as *Iphigenia* in some areas such as Ikoyi jetty.

The average water depth in the areas where *Iphigenia truncata* was found was 2 metres.

FUNCTIONAL ANATOMY

The Siphons

The siphons of *Iphigenia truncata* are long, narrow and separate as in other Tellinacea (Yonge, 1949). The exhalant siphon is more extensive than the inhalant one, extending out of

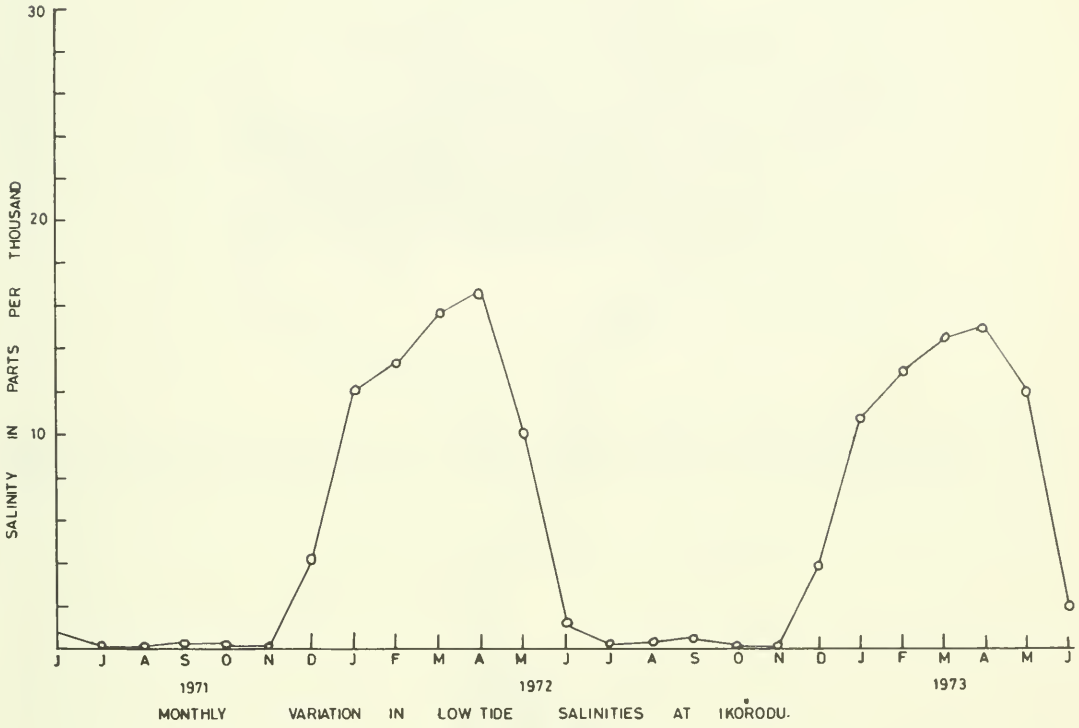

FIG. 2. Monthly variation of salinities at Ikorodu.

the shell about 32 mm, while the average length of the inhalant siphon is 14 mm (Fig. 3). The tip of the inhalant siphon is bordered by 12 lobes, there being no true tentacles. The tip of the exhalant siphon is slightly constricted. Unlike many Tellinacea, the tips of the siphons are sensitive to touch and are quickly withdrawn, even when touched slightly.

In cross-section, the siphons of *Iphigenia* have the characteristic appearance of Tellinacea as described by Towitz (1892). The arrangement of the nerves of the siphon is, however, not typical. There are 6 nerves in the inhalant siphons and 8 in the exhalant siphons (Fig. 4).

The Ctenidia

Fig. 5 shows the organs of the mantle cavity. Each ctenidium consists of 2 unequal demibranchs, the outer being less deep and with a considerable supra axial extension (Fig. 6). The ctenidia are plicate. At the free margin of each inner demibranch is a deep marginal food groove (Fig. 6). The labial palps are small and triangular in shape. The ciliary currents of the mantle cavity shown in Fig. 5 are similar to those of the Tellinacea described by Atkins (1937), Graham (1937), Yonge (1949) and Purchon (1963).

The Alimentary Canal

The course of the alimentary canal in *Iphigenia truncata* is shown in Fig. 7. Behind the entrance of the oesophagus to the left is the large dorsal pouch. The postero-dorsal caecum in this species is small; the significance of this is discussed later.

The digestive diverticula form a dense mass of brown tubules around the stomach. Arising ventrally from the stomach is the wide style sac, which runs down to the left side of the foot. The midgut in *Iphigenia truncata* is separate from the style sac and it arises from the ventral

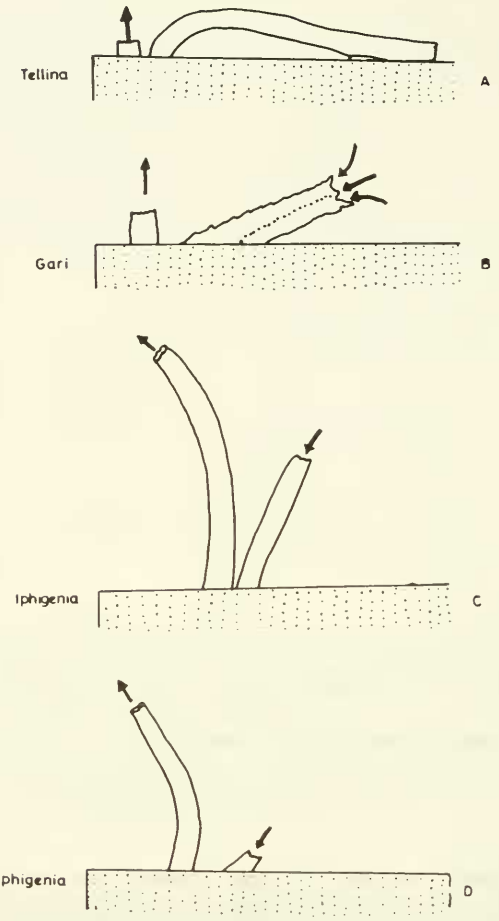

FIG. 3. Positions of the siphons of *Iphigenia truncata* compared with those of two other Tellinacea—*Gari* and *Tellina.*

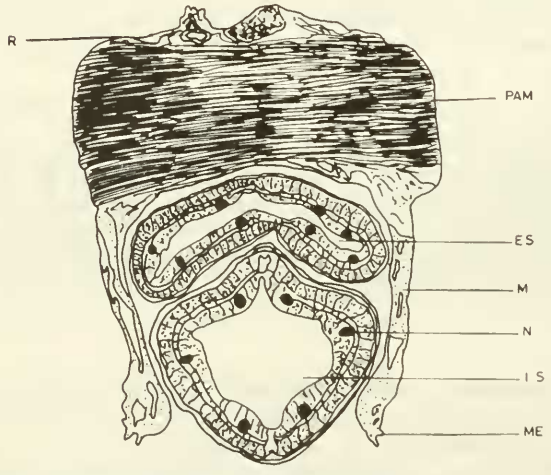

FIG. 4. Transverse section of *Iphigenia* through the posterior adductor muscle and siphons. EF = Exhalant Siphon; IS = Inhalant Siphon; M = Mantle Lobe; ME = Mantle Edge; N = Nerve; PAM = Posterior Adductor Muscle; R = Rectum.

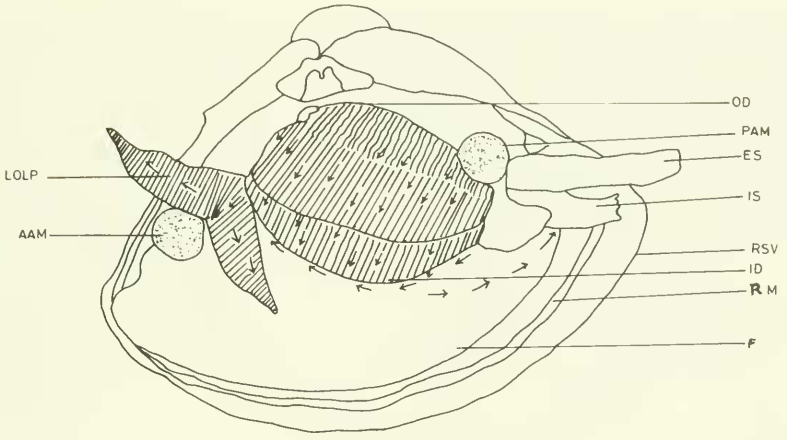

FIG. 5. Organs and ciliary currents of the mantle cavity. AAM = Anterior Adductor Muscle; ES = Exhalant Siphon; F = Foot; ID = Inner Demibranch; IS = Inhalant Siphon; LOP = Left Outer Labial Palp; OD = Outer Demibranch; PAM = Posterior Adductor Muscle; RSV = Right Shell Valve; RM = Right Mantle Lobe.

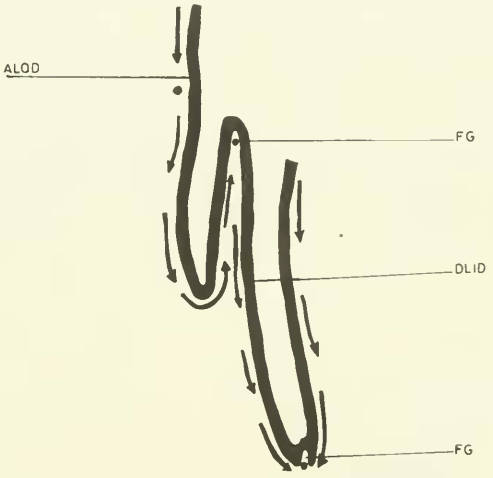

FIG. 6. Diagrammatic section of the left ctenidium showing the ciliary currents. ALOD = Ascending Limb of Outer Demibranch; DLID = Descending Limb of Inner Demibranch; F = Food groove.

side of the stomach and runs ventralward on to the right side of the style sac. The midgut is much coiled behind the stomach before it runs through the heart to open below the posterior adductor muscle. The hind gut contains rod-shaped faecal pellets with rounded ends.

Examination of the stomach contents reveals the occurrence of fragments of *Coscinodiscus* and detritus, but few sand grains.

Reproduction

Iphigenia truncata reproduces during the high salinity period—November-March. Sections of specimens collected during these months contained numerous larvae in the mantle cavity in various stages of development. As in the laviparous oysters, the infrabranchial part of the mantle cavity serves as a temporary brood chamber for the developing eggs. The larvae are released at an advanced stage and hence spend a short time in the plankton.

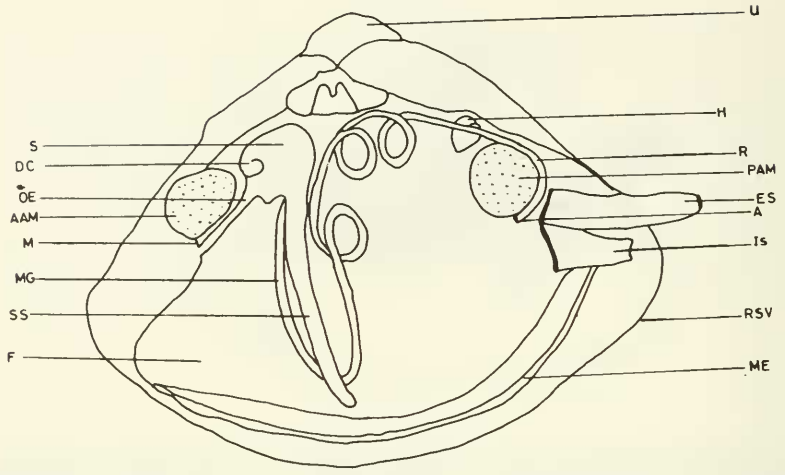

FIG. 7. The alimentary canal. A = Anus; AAM = Anterior Adductor Muscle; DC = Dorsal Caecum; ES = Exhalant Siphon; F = Foot; H = Heart; IS = Inhalant Siphon; M = Mouth; MG = Mid Gut; ME = Mantle Edge; OE = Oesophagus; PAM = Posterior Adductor Muscle; R = Rectum; RSV = Right Shell Valve; S = Stomach; SS = Style Sac; U = Umbo.

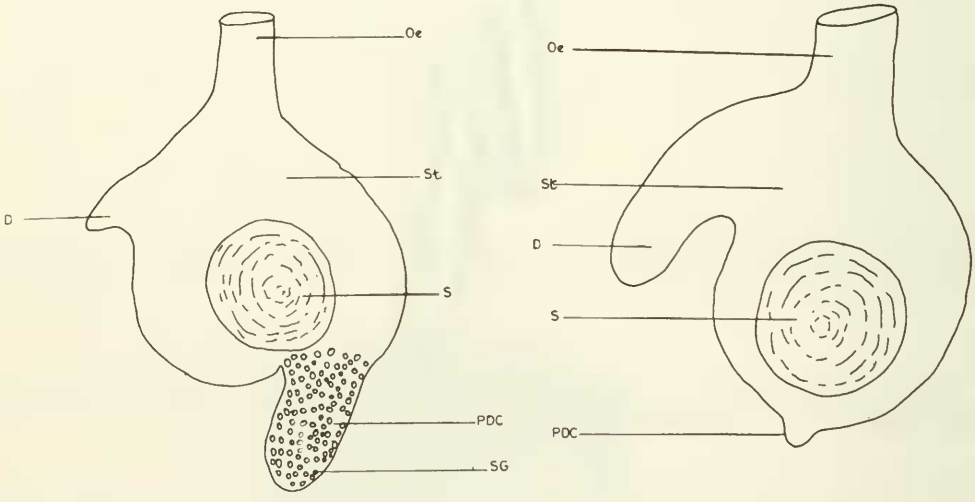

FIG. 8. Dorsal view of the stomach—*Iphigenia truncata* and *Tellina*. D = Dorsal Pouch; OE = Oesophagus; POC = Posterio-Dorsal Caecum; St = Stomach; S = Style; SG = Sand Grain.

DISCUSSION

The present work indicates that the feeding mechanism of *Iphigenia* is not typical of deposit feeders.

Fig. 3C and D show the position of the siphons of *Iphigenia* during feeding. Most of the time (3C) the inhalant siphon projects about 15 mm above the ground level, but on some occasions, it is shortened and projects only about 3 mm above the ground (Fig. 3D). When extended, the inhalant siphon is erect and does not lie on the floor as in the Tellinidae. It

therefore seems that the inhalant siphons collect suspended particles most of the time, and particles lying in suspension above the floor during the times they are shortened (Fig. 3D).

Though the ciliary currents of the gills, palps and mantle cavity are similar to those of the other bottom-feeding Tellinacea, the stomach seems to be adapted for suspension feeding. Thus, the stomach has a large dorsal pouch with extensive sorting ridges and grooves like in typical suspension-feeding lamellibranchs such as *Mya.* In typical bottom-feeding Tellinacea, such as *Tellina,* there is a large postero-dorsal caecum in the stomach in which large particles are temporarily stored before trituration between the style and the teeth of the large gastric shield (Yonge, 1949). Fig. 8 shows that *Iphigenia truncata* has a very small postero-dorsal caecum which contained no sand grains or mud. The absence of a postero-dorsal caecum in this species may be correlated with the fact that it feeds mostly on suspended particles.

The reproduction of *Iphigenia truncata* is of interest since the species is a member of the typically marine family Donacidae, which has recently invaded brackish and fresh waters. The incubation of eggs in the mantle cavity may enable this species now restricted to the brackish parts of the Lagos lagoon to move up the rivers and to other areas of the lagoon which remain fresh all year round.

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